

I-395 at Shirlington Circle Interchange Improvements



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Presentation Overview

01

Project Background

Study context, location, and stakeholder team

02

Existing Conditions

Current operational and safety issues

03

Traffic Forecasting

Design Year (2055) and Opening Year (2035) traffic volume forecasting

04

Proposed Alternatives

Alternative 1 and Alternative 2 improvement concepts

05

Design Year Analysis

Design year (2055) operational and safety analysis method & results

06

Recommendation & Cost Estimate

Preferred alternative and next steps

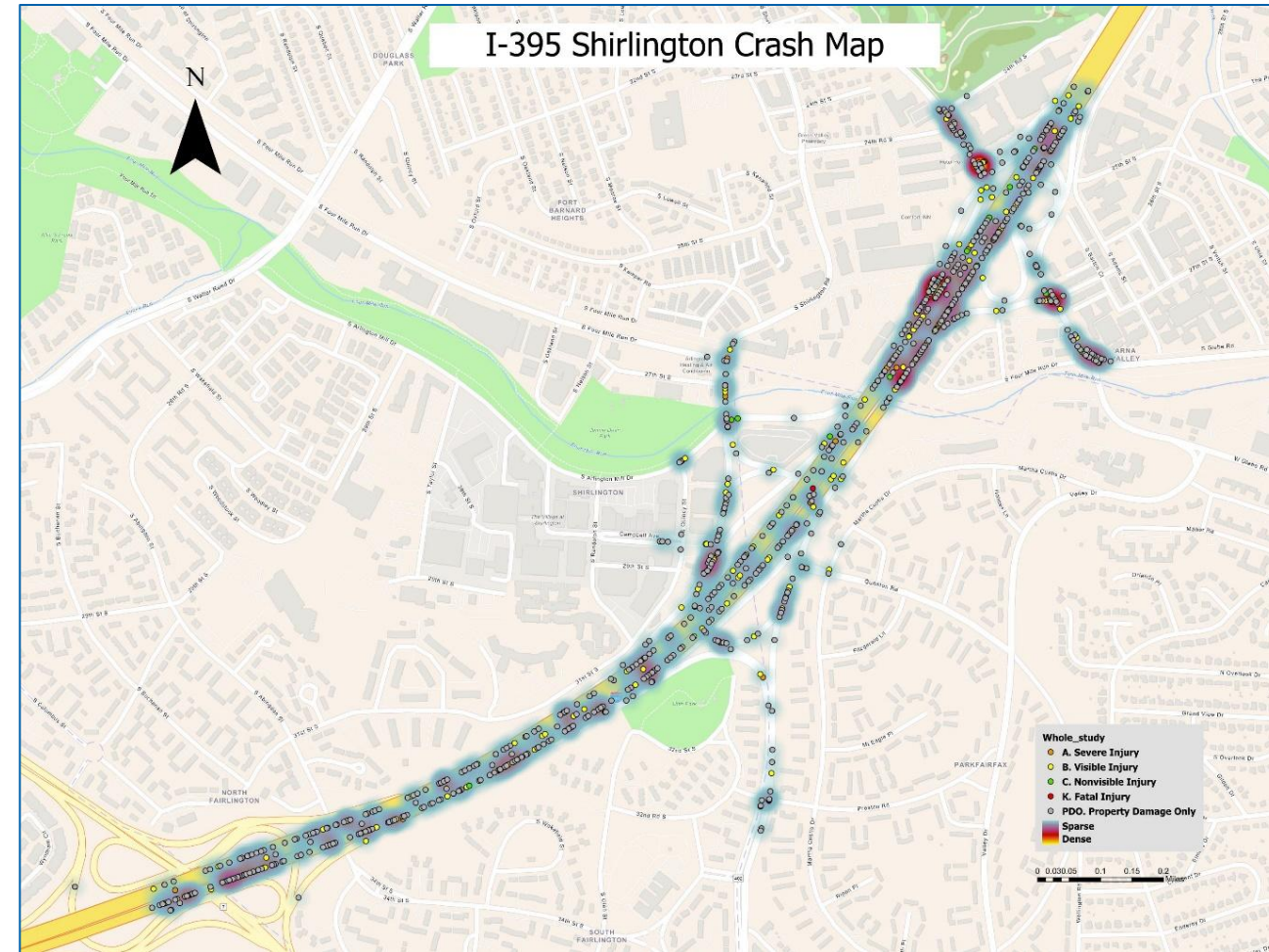
Project Background - Study Area

- I-395 Shirlington “Rotary” Interchange originally built in the early 1970s
- Closely spaced interchanges along I-395
- Reversible Express Lanes with north serving ramp connection
- Residential to the east, and mixed-use to the west
- Rotary AADT 6,100 – 36,000
- 2020 Feasibility and Planning Study (WSP + RK&K)
- 2023-2024 VDOT TMPD Study



Existing Conditions – Safety Issues

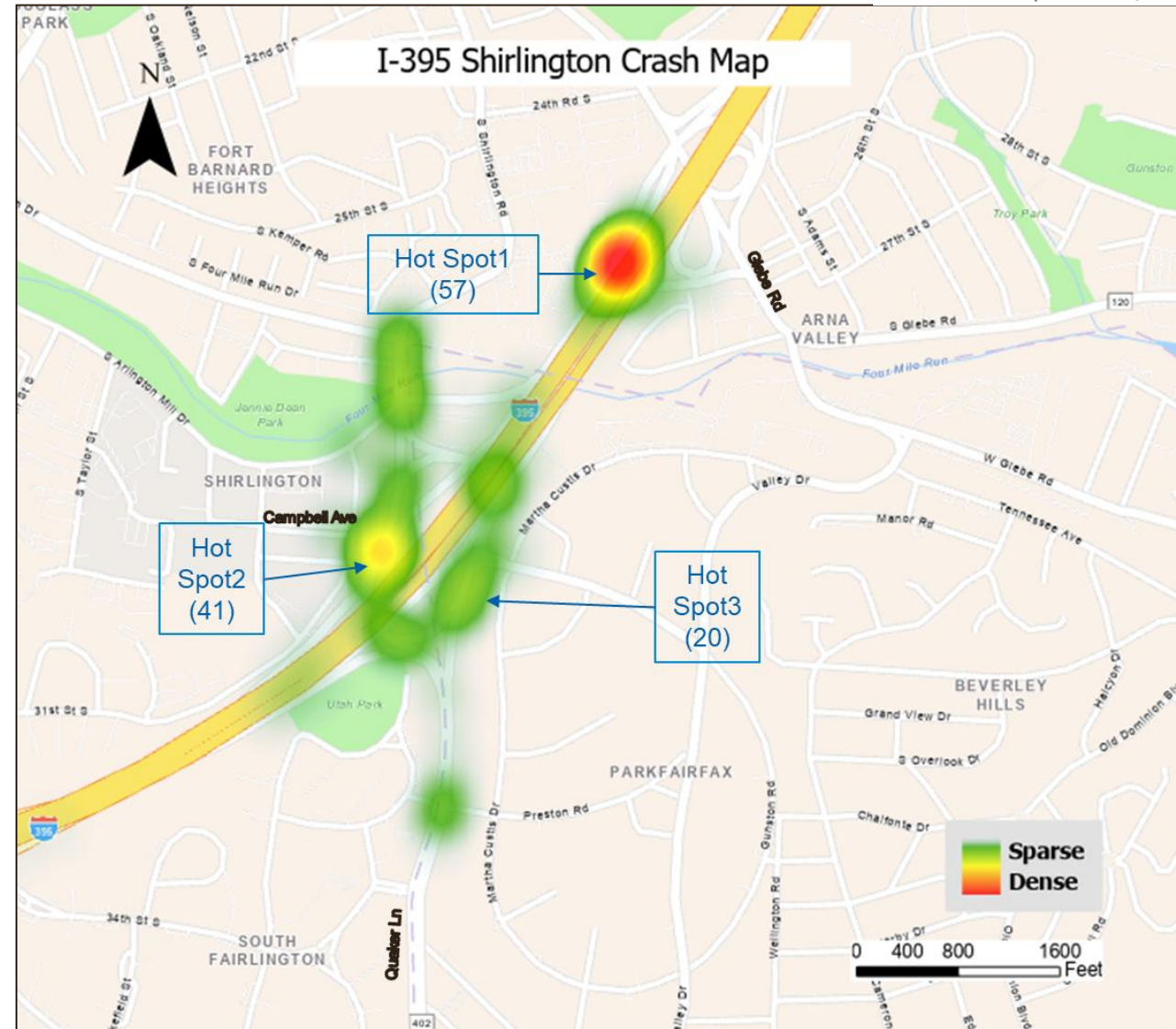
- Total Crashes within study area – 965 / 5-years
- Crashes within Shirlington Circle Rotary – 84 / 5-years
 - 51% Rear-end collisions, 22% Sideswipe collisions, and 13% angle crashes
 - 23% crashes during PM peak period (3 PM to 6 PM)
 - 21% injury related crashes



Existing Conditions – Safety Issues

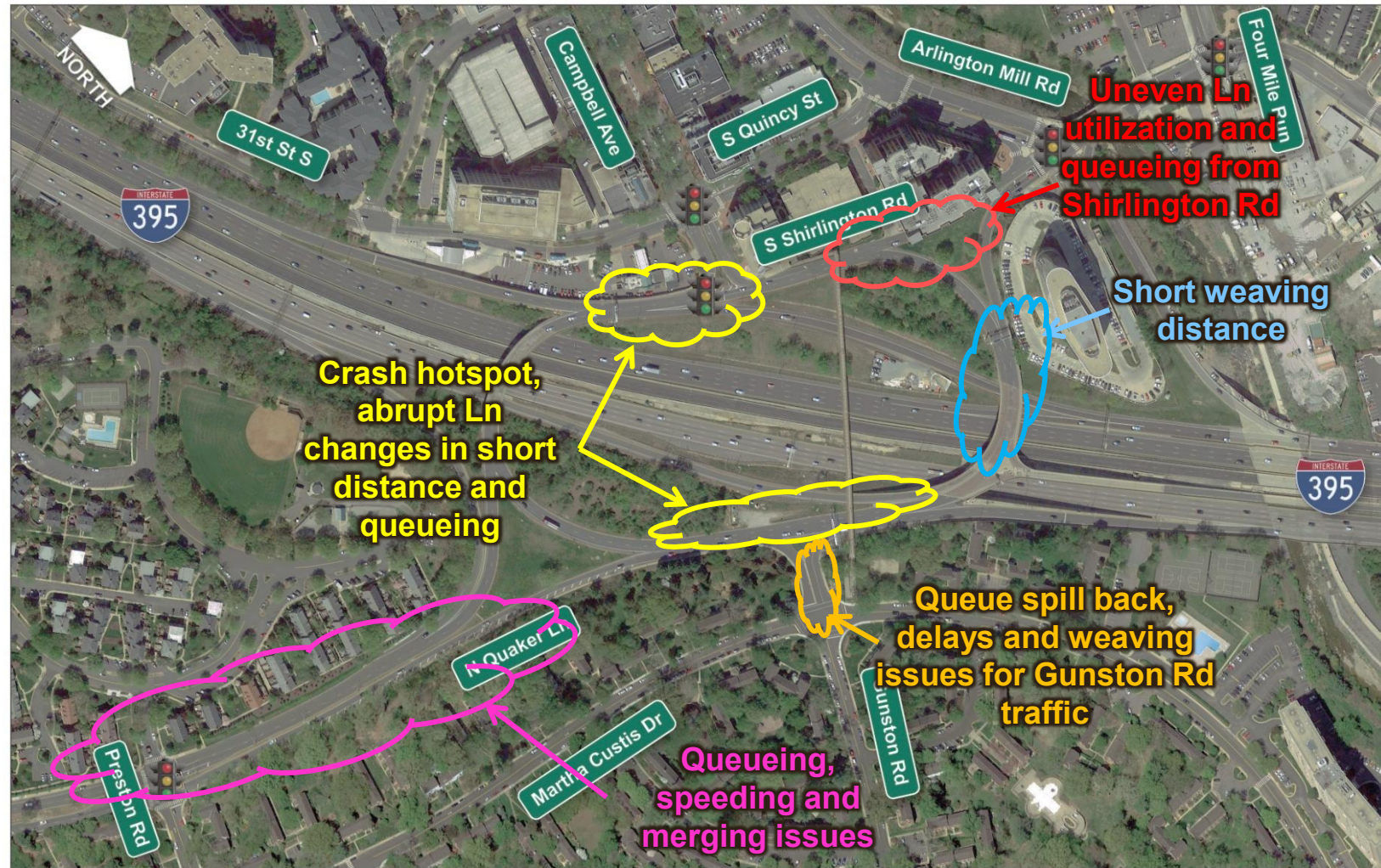
Crash hotspots

1. S. Glebe Road SB and I-395 SB CD Lane merge – 57 crashes (91% Rear-end, 26% speeding related, 30% under darkness-road not lighted condition)
2. Shirlington Circle at Quincy St/I-395 SB Ramp Merge – 41 crashes (63% Rear-end, 20% sideswipe, 29% speeding related)
3. Shirlington Circle at N Quaker Ln and Gunston Rd – 20 crashes (75% Rear-end, 25% under darkness-road not lighted condition)



Existing Conditions – Operational Issues

- Range of operational issues
 - Several merge and diverge areas
 - Short access spacing & abrupt lane changes
 - AM queue spillback from I-395 NB
 - PM queue spillback to I-395 SB



- **MWCOG Travel Demand Model (TDM) *Version 2.4* outputs.**
- **Design Year (2055)**
- **Estimated growth rates**
 - **I-395 and other side streets - 0.5%**
 - **Quaker Lane – 1.2%**
 - **Gunston Road – 1.8%**

Hybrid Alternative from the 2020 VDOT Study

Existing Condition



Hybrid Alternative



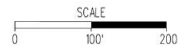
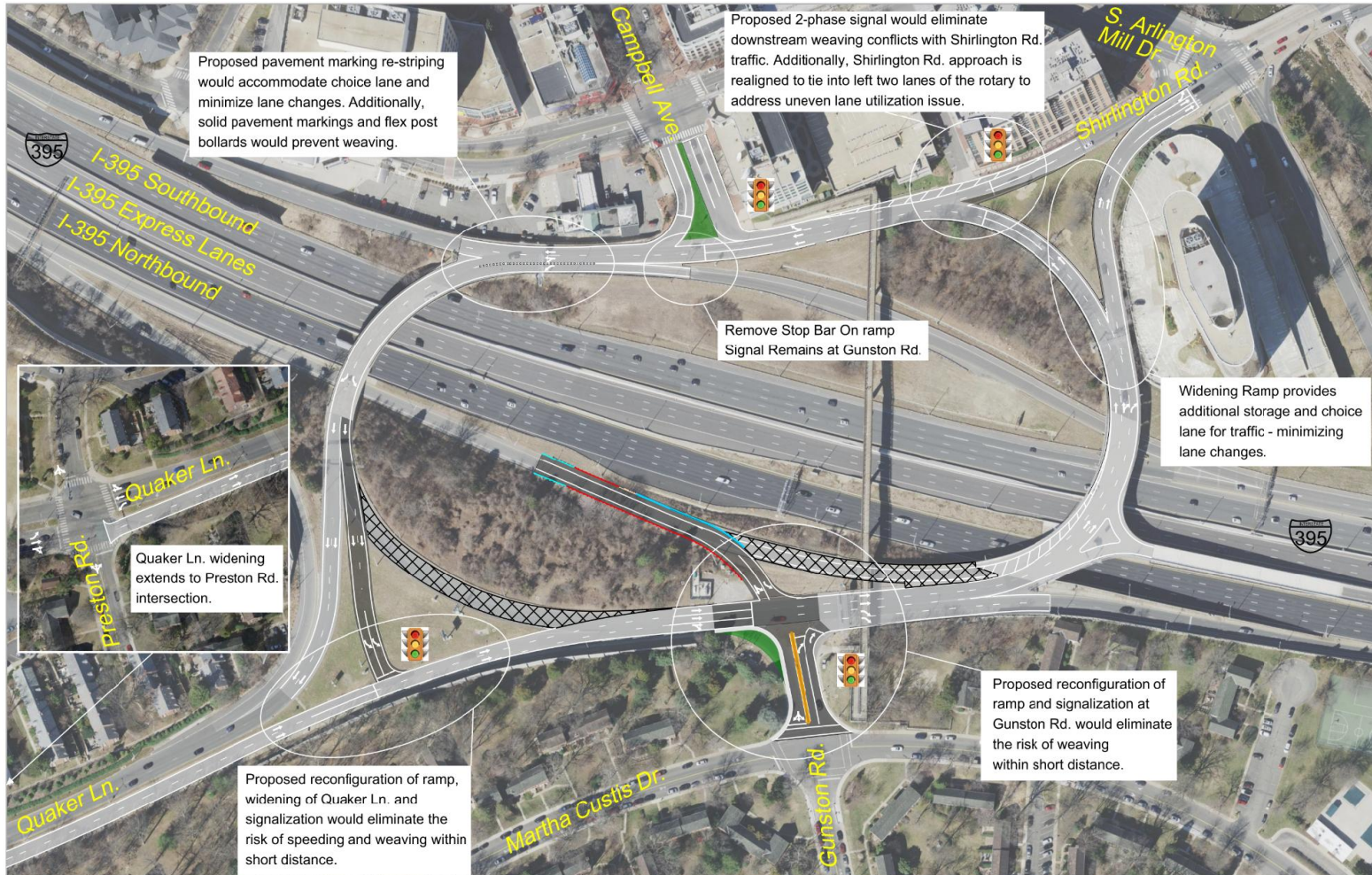
Proposed Alternatives - Rotary Alternative 1



Legend

- Proposed Pavement
- Resurfaced Pavement
- Demolition of Pavement
- Proposed Grass Area
- Proposed Concrete Island
- Proposed Guardrail
- Proposed Concrete Barrier

Proposed Alternatives - Rotary Alternative 2

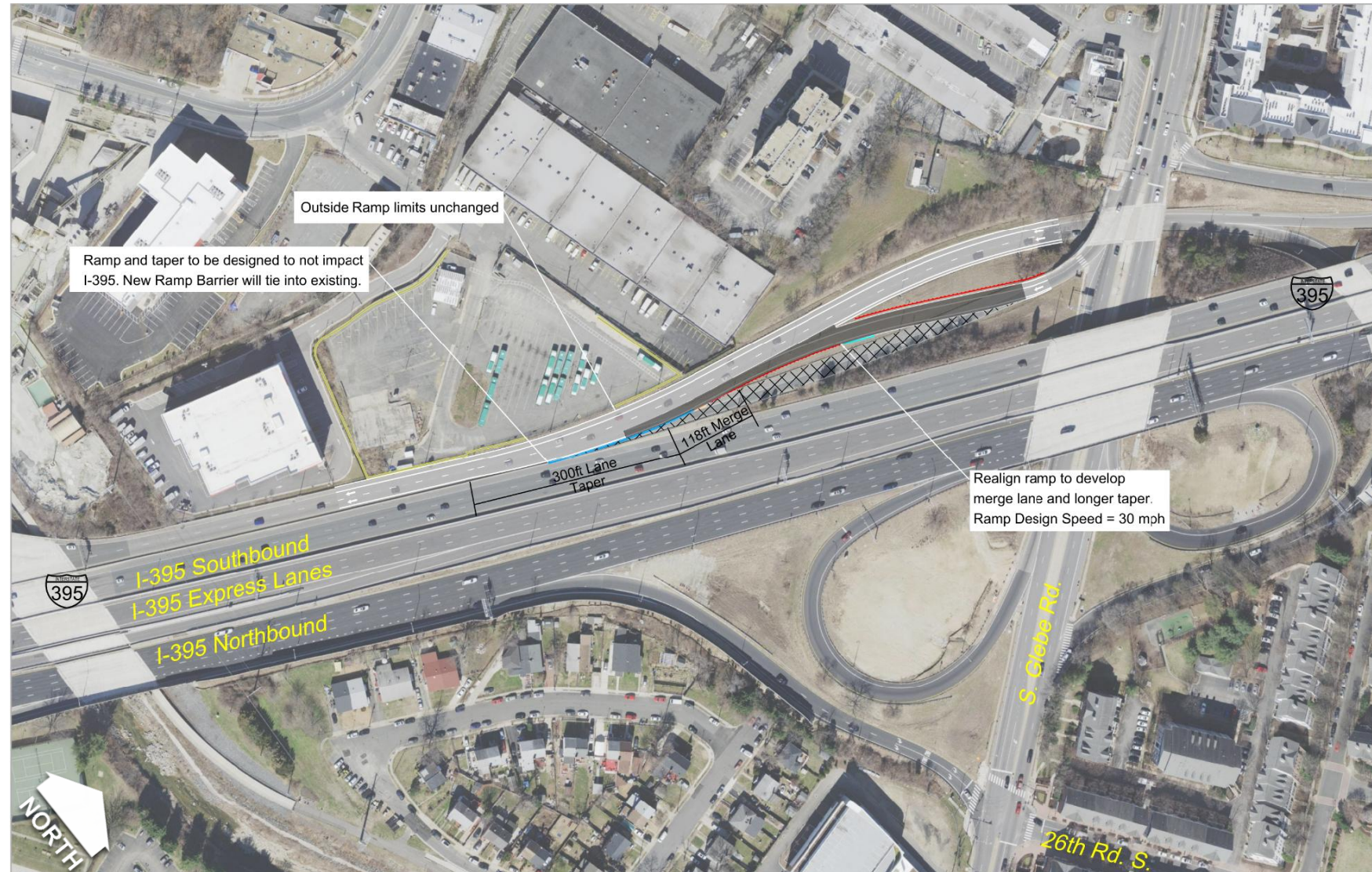


Legend	Proposed Pavement	Resurfaced Pavement	Demolition of Pavement	Proposed Grass Area	Proposed Concrete Island	Proposed Guardrail	Proposed Concrete Barrier

Proposed Alternatives - Glebe Rd Alternative 1

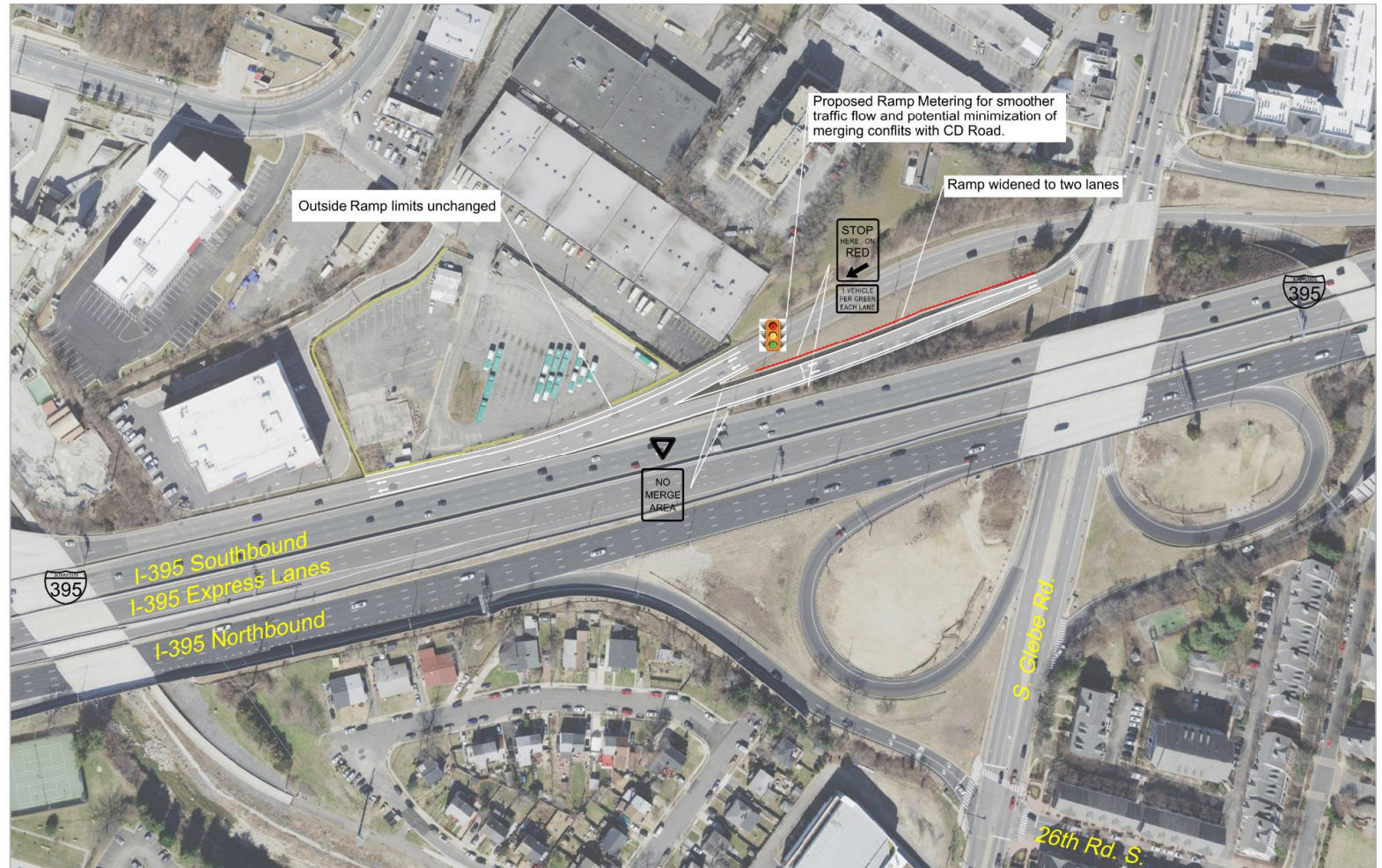
Existing taper merge area
is approximately 184 ft:

Proposed:
118 ft full width from
painted gore + 300 ft taper



Proposed Alternatives - Glebe Rd Alternative 2

Existing taper merge area
is approximately 184 feet



SCALE
0 100' 200'

Legend



Proposed Pavement



Resurfaced Pavement

Proposed Guardrail

Design Year (2055) Operational Analysis Results

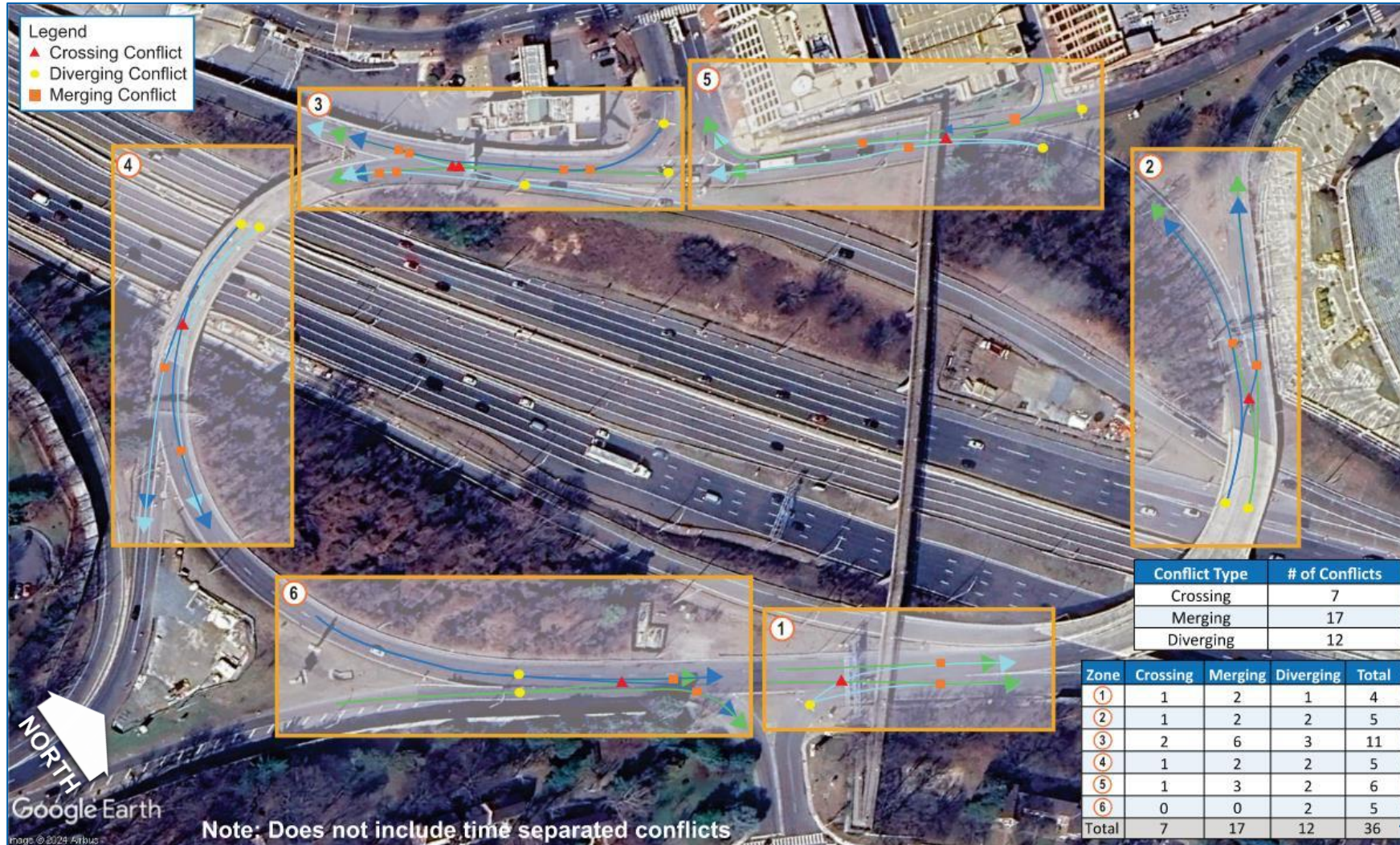
Performance Metric	No-Build (2055)	Alternative 1 ★ (2055)	Alternative 2 (2055)
SB Off-Ramp Queue at Campbell Ave	Extends onto C-D Road	~265 ft (within gore area)	~265 ft (within gore area)
I-395 Operations vs. No-Build	Queue spillback from Rotary to mainline.	✓ Superior (No-Spillback)	✓ Superior (No-Spillback)
S. Glebe Rd Merge Operations	Deficient	✓ Superior (accel. lane)	Moderate (ramp meter)
Lane Changes within Shirlington Circle	Uneven & Abrupt	✓ Controlled	✓ Controlled
Travel Time Through Shirlington Circle	Congested + Gridlock	+~90 sec (due to signals)	+~90 sec (due to signals)

Design Year (2055) Safety Analysis

- **Qualitative conflict analysis**
 - Critical weaving areas divided into 7 zones for analysis
 - # of time-separated conflicts for each zone were calculated
 - Compared total # of conflicts under each alternative
- **Quantitative analysis**
 - Existing streetlight O-D patterns to determine weaving traffic
 - Determined crash rates based on available CMFs
 - Utilized Design Year (2055) daily volumes and crash rates to estimate crashes under each alternative.

Qualitative Safety Analysis Results

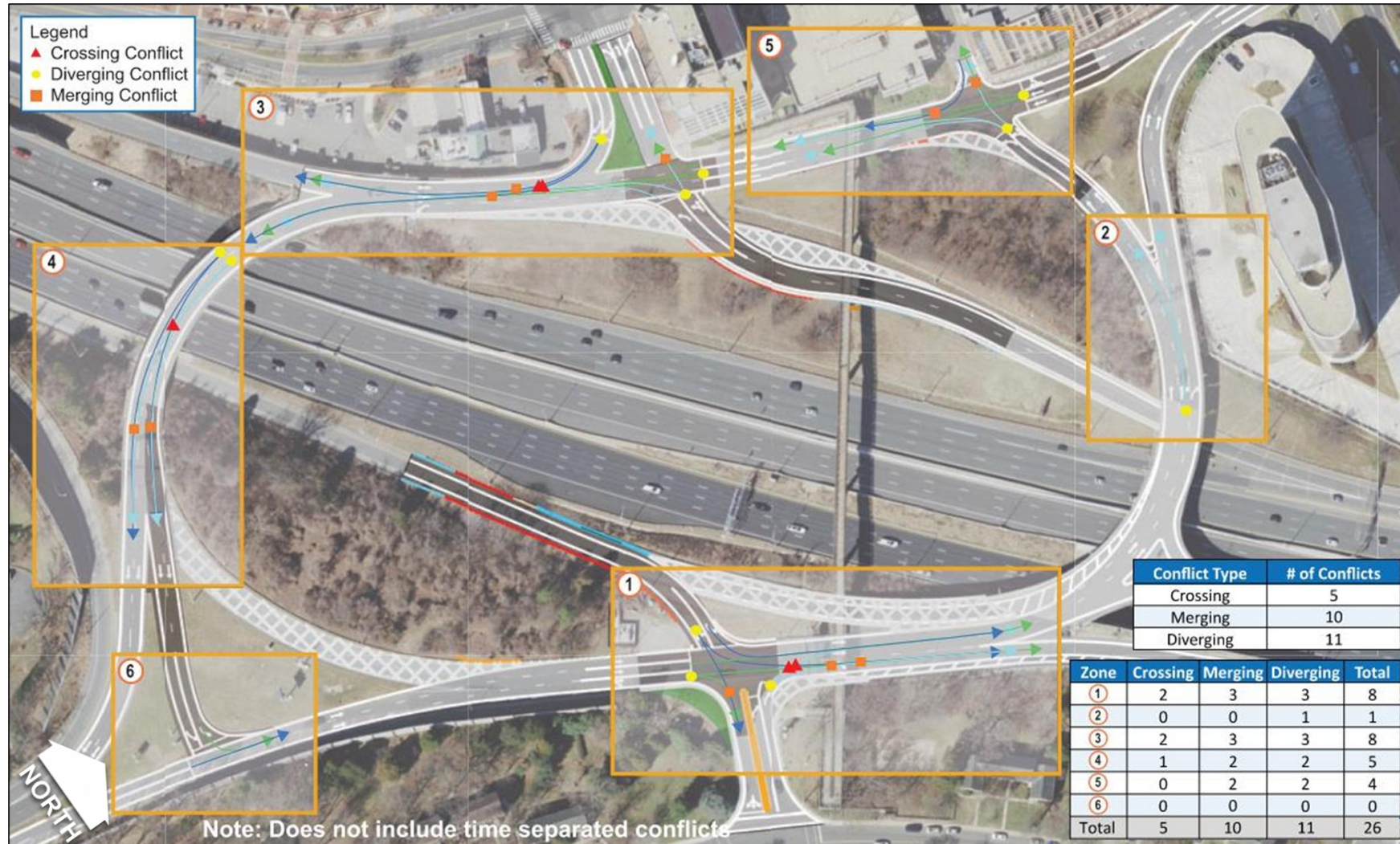
No-Build Condition Uncontrolled Conflicts



Total # of conflict points: 36

Qualitative Safety Analysis Results

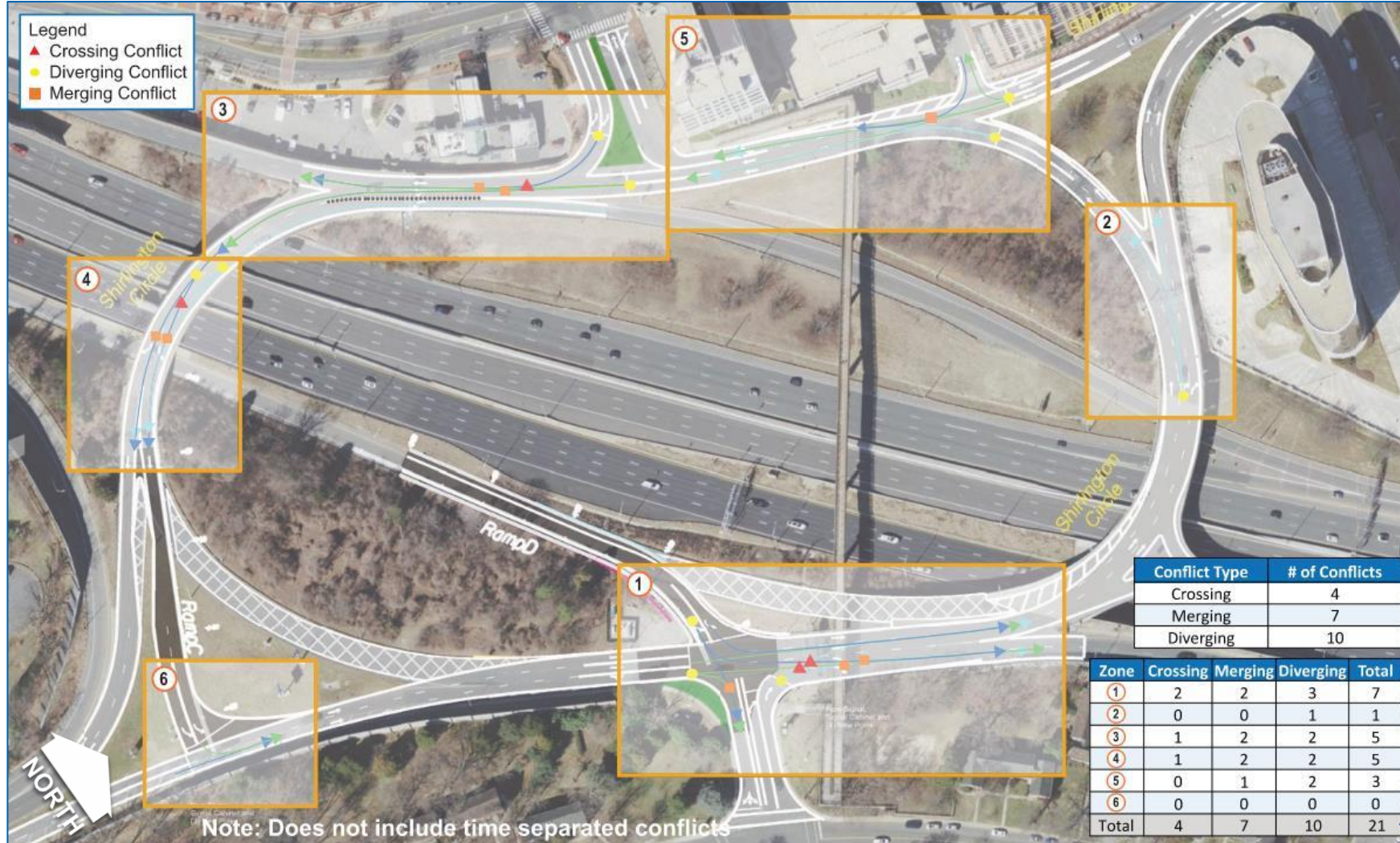
Build Alternative 1 Uncontrolled Conflicts



Total # of conflict points: 26

Qualitative Safety Analysis Results

Build Alternative 2 Uncontrolled Conflicts



Total # of conflict points: 21

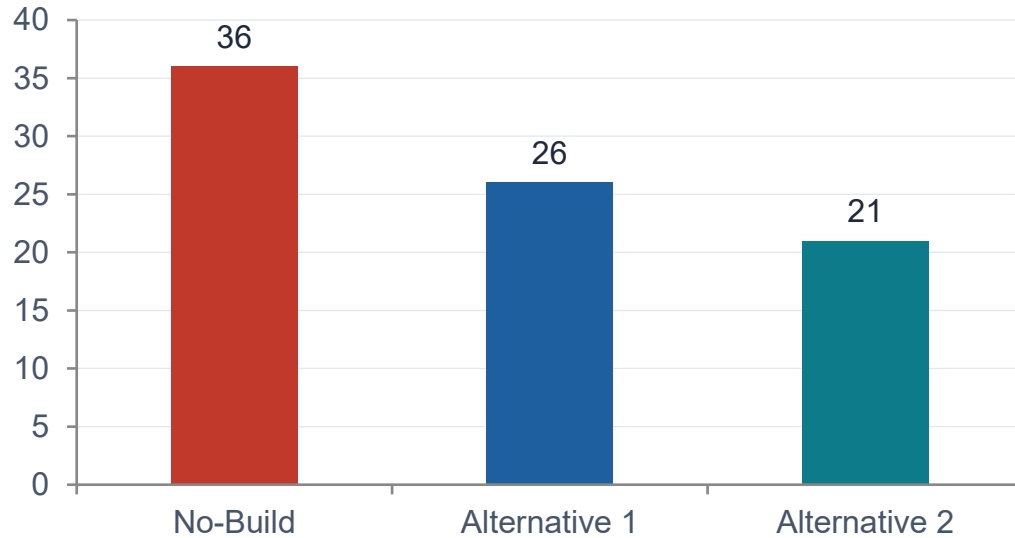
Quantitative Safety Analysis Results

Zone	Existing Year (2023)			Future 5-Year Estimates Based on Design Year (2055)		
	# of Reported Crashes (2017-2022)	# of Estimated Crashes under Preferred Alternative Configuration (2017-2022)	Difference (Estimated vs Reported)	Future No-Build (5-Year Crash Period)	Future Build (5-Year Crash Period)	Difference (Estimated vs Reported)
1	12	11	-1	17	15	-2
2	4	-	-	5	-	-
3	33	34	1	38	39	1
4	12	-	-	14	-	-
5	9	8	-1	10	9	-1
6	16	16	0	23	21	-2
7	57	52	-5	66	61	-5

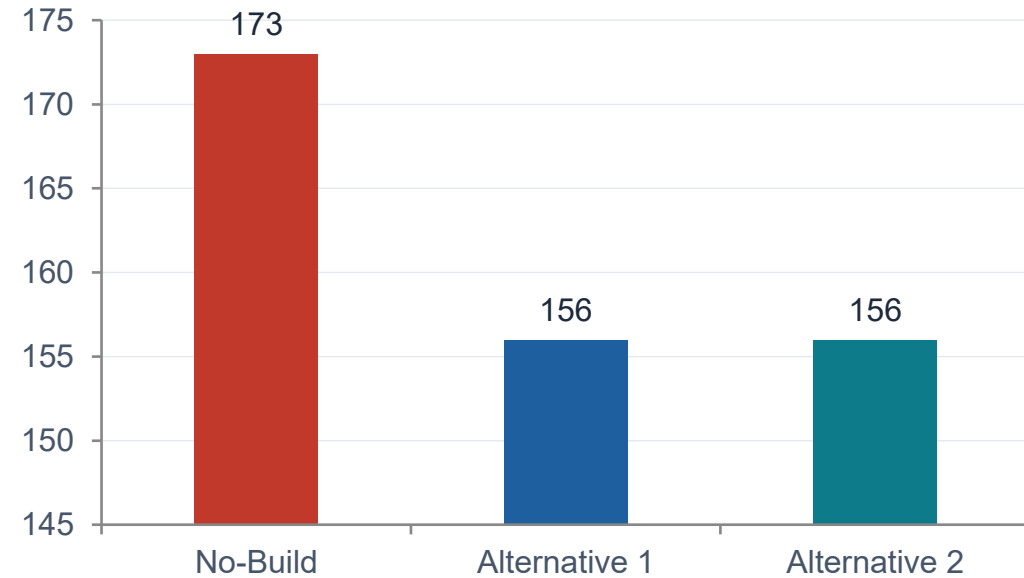
Build alternatives are expected to reduce 11 crashes per year compared to the No-Build scenario

Design Year (2055) Safety Analysis Results

Qualitative Analysis: # of Non-time-separated Conflict Points



Quantitative Analysis: Projected Annual # of Crashes



Both Build alternatives are projected to reduce high-risk angle and sideswipe collisions. While traffic signals may slightly increase lower-risk rear-end collisions, overall safety improves with a 9.7% crash reduction relative to No-Build. Alternative 2 achieves slightly fewer conflict points (21 vs. 26), but Alternative 1 offers superior operational performance.

★ RECOMMENDED: ALTERNATIVE 1 – PREFERRED BUILD OPTION

Superior Operational Benefits

- Better manages traffic entering Shirlington Circle from I-395.
- Even lane utilization from a driver's perspective with fewer uncontrolled conflicts.
- Improved operations at the S. Glebe Rd merge junction.

Effective Safety Improvements

- Reduces uncontrolled conflict points from 36 to 26. Projects 9.7% crash reduction vs. No-Build.
- Addresses highest-risk uncontrolled weaving/merging maneuvers.

Meaningful Cost vs. Benefit

- Estimated construction cost: ~\$24.71 Million (2024 dollars).
- Minimal ROW impacts; near-term implementability.
- **Approved for SmartScale Round 6 funding.**

NEXT STEPS: **SmartScale Round 6 Funding Application** → NEPA Environmental Analysis → Preliminary Engineering & Design → Right-of-Way (minimal) → Construction

Stakeholders

